IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of: Alexandre Blais	Group Art Unit: 2811
Serial No.: 09/782,886	Examiner: To be determined
Filing Date: February 13, 2001	Attorney Docket No.: 11090-030-999
Title: OPTIMIZATION METHOD FOR QUANTUM COMPUTING PROCESS	Date: October 29, 2002 Confirmation No.: 3344

INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In accordance with the duty of disclosure provisions of 37 C.F.R. §1.56, there is hereby provided certain information which the Examiner may consider material to the examination of the subject U.S. patent application. It is requested that the Examiner make this information of record if it is deemed material to the examination of the application.

1. Enclosures accompanying this Information Disclosure Statement are:

1a. ■ A list of all patents, publications, applications, or other information submitted for consideration by the office.

1b. A legible copy of :

■ Each U.S. patent application publication and U.S. and foreign patent;

■ Each publication or that portion which caused it to be listed on the PTO-1449;

■ For each cited pending U.S. application, the application specification including the claims, and any drawing of the application, or portion of the application which caused it to be listed on the PTO-1449 including any claims directed to that portion;

☐ all other information or portion which caused it to be listed on the PTO-1449.

1c. ☐ An English language copy of search report(s) from a counterpart foreign application or PCT International Search Report.

1d. ☐ Explanations of relevancy (ATTACHMENT 1(d), hereto) or English language abstracts of the non-English language publications.

2. ☐ This Information Disclosure Statement is filed under 37 C.F.R. §1.97(b):

☐ Within three months of the filing date of a national application other than a continued prosecution application under §1.53(d);

☐ Within three months of the date of entry of the national stage as set forth in §1.491 in an international application;

■ Before the mailing of the first Office action on the merits;

☐ Before the mailing of a first Office action after the filing of a request for continued examination under §1.114.

3. ☐ This Information Disclosure Statement is filed under 37 C.F.R. §1.97(c) after the period specified in 37 C.F.R §1.97(b), but before the mailing date of any of a final action under 37 C.F.R. §1.113, a notice of allowance under 37 C.F.R. §1.311 or an action that otherwise closes prosecution in the application.

(Check either Item 3a or 3b)

3a. ☐ The Certification Statement in Item 5 below is applicable. Accordingly, no fee is required.

3b. ☐ The $180.00 fee set forth in 37 C.F.R. §1.17(p) in accordance with 37 C.F.R. §1.97(c) is:
☐ enclosed
☐ to be charged to Pennie & Edmonds LLP Deposit Account No. 16-1150.

(Item 3b to be checked if any reference known for more than 3 months)

4. ☐ This Information Disclosure Statement is filed under 37 C.F.R. §1.97(d) after the period specified in 37 C.F.R. §1.97(c), but on or before the date of payment of the issue fee.

The $180.00 fee set forth in 37 C.F.R. §1.17(p) is:
☐ enclosed.
☐ to be charged to Pennie & Edmonds LLP Deposit Account No. 16-1150.

The Certification Statement in Item 5 below is applicable.

5. ☐ Certification Statement *(applicable if Item 3a or Item 4 is checked)*

(Check either Item 5a or 5b)

5a. ☐ In accordance with 37 C.F.R. §1.97(e)(1), it is certified that each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement.

5b. ☐ In accordance with 37 C.F.R. §1.97(e)(2), it is certified that no item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application and, to the knowledge of the undersigned after making reasonable inquiry, was known by any individual designated in 37 C.F.R. §1.56(c) more than three months prior to the filing of this Information Disclosure Statement.

6. ☐ This application is a continuation application under 37 C.F.R. §1.60 or §1.53(b) or (d).

(Check appropriate Items 6a, 6b and/or 6c)

6a. ☐ A Petition to Withdraw from issue under 37 C.F.R. §1.313(b)(5) is concurrently filed herewith.

6b. ☐ Copies of publications listed on Form PTO-1449 from prior application Serial No. , filed on , of which this application claims priority under 35 U.S.C. §120, are not being submitted pursuant to 37 C.F.R. §1.98(d).

6c. ☐ Copies of the publications listed on Form PTO-1449 were not previously cited in prior application Serial No. , filed on , and are provided herewith.

7. ☐ This is a Supplemental Information Disclosure Statement. *(Check either Item 7a or 7b)*

7a. ☐ This Supplemental Information Disclosure Statement under 37 C.F.R. §1.97(f) supplements the Information Disclosure Statement filed on . A bona fide attempt was made to comply with 37 C.F.R. §1.98, but inadvertent omissions were made. These omissions have been corrected herein. Accordingly, additional time is requested so that this Supplemental Information Disclosure Statement can be considered as if properly filed on __.

7b. ☐ This Supplemental Information Disclosure Statement is timely filed within one (1) month of a PTO Notice under 37 C.F.R. §1.97(i).

8. ☐ In accordance with 37 C.F.R. §1.98, a concise explanation of what is presently understood to be the relevance of each non-English language publication is:

(Check Item 8a, 8b, or 8c)

8a. ☐ satisfied because all non-English language publications were cited on the enclosed English language copy of the PCT International Search Report or the search report from a counterpart foreign application indicating the degree of relevance found by the foreign office.

8b. ☐ set forth in the application.

8c. ☐ enclosed as an attachment hereto.

9. ■ The Commissioner is authorized to charge any additional fee required or credit any overpayment for this Information Disclosure Statement and/or Petition to Pennie & Edmonds LLP Deposit Account No. 16-1150.

10. ■ No admission is made that the information cited in this Statement is, or is considered to be, material to patentability nor a representation that a search has been made (other than a search report of a foreign counterpart application or PCT International Search Report if submitted herewith). 37 C.F.R. §§1.97(g) and (h).

Respectfully submitted,

Date 10/29/02

31,066
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PTO/SB/08A (10-01)
Approved for use through 10/31/2002. OMB 0651-0031
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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet	1	of	4

Complete if Known	
Application Number	09/782,886
Filing Date	February 13, 2001
First Named Inventor	Blais, Alexandre
Art Unit	2811
Examiner Name	
Attorney Docket Number	11090-030-999

U.S. PATENT DOCUMENTS

Examiner Initials	Cite No.[1]	Document Number Number - Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	AA	US-5,768,297	6/6/98	Peter W. Shor	
	AB	US-6,301,029	10/9/01	Hiroo Azuma	
	AC	US-6,317,766	11/13/01	Lov K. Grover	
	AD	US20010020701A1	9/13/01	Zagoskin	
	AE	US20010023943A1	9/27/01	Zagoskin	

FOREIGN PATENT DOCUMENTS

Examiner Initials	Cite No.[1]	Foreign Patent Document Country Code[3] - Number[4] - Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	AF					
	AG					

OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)

	AH	E. Aarts and J. Korst, *Simulated Annealing and Boltzmann Machines*, pp. 12- 27 (Wiley, New York, 1989).
	AI	D.S. Abrams and S. Lloyd, "Quantum Algorithm Providing Exponential Speed Increase for Finding Eigenvalues and Eigenvectors" Physical Review Letters 83, pp. 5162-5165 (1999).
	AJ	A. Barenco, Charles H. Bennett, Richard Cleve, David P. Divencenzo, Norman Margolus, Peter Shor, Tycho Sleator, John A Smolin, and Harald Weinfurter, "Elementary gates for quantum computation", Physical Review A 52, 3457-3467 (1995).

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
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	AK	David Beckman, Amalavoyal N. Chari et al., "Efficient networks for quantum factoring", Los Alamos National Laboratory preprint quant-ph/9602016 (1996), accessed October 2, 2002.
	AL	Blais and A.M. Zagoskin, "Operation of universal gates in a solid-state quantum computer based on clean Josephson junctions between d-wave superconductors" Physical Review A 61, 042308 (2000).
	AM	Mark F. Bocko, Andrea M. Herr and Marc J. Feldman, "Prospect for Quantum Coherent Computation Using Superconducting Electronics", IEEE Transactions on Applied Superconductivity 7, 3638 (1997).
	AN	Guido Burkard, Daniel Loss, David P. DiVincenzo and John A. Smolin, "Physical optimization of quantum error correction circuits" Physical Review B 60, pp. 11404-11416 (1999).
	AO	R. Cleve and J. Watrous, "Fast parallel circuits for the quantum Fourier transform" Los Alamos National Laboratory preprint quant-ph/0006004 (2000), accessed October 2, 2002.
	AP	D. Coppersmith, "An approximate Fourier transform useful in quantum factoring" Los Alamos National Laboratory preprint quant-ph/0201067, accessed October 2, 2002.
	AQ	David G. Cory, Amr F. Fahmy, and Timothy F. Havel , "Ensemble quantum computing by NMR spectroscopy" Proceedings of the National Academy of Science U.S.A. 94, pp. 1634 –1639 (1997).
	AR	D. Deutsch, "Quantum theory, the Church-Turing principle and the universal quantum computer" Proceedings of the Royal Society of London A 400, pp. 97 – 117 (1985).
	AS	D. DiVincenzo in *Scalable Quantum Computers*, S.L. Braunstein and H.K. Lo (eds.), chapter 1, Wiley-VCH Verlag GmbH, Berlin (2001), also published as Los Alamos National Laboratory preprint quant-ph/0002077 (2000), accessed October 2, 2002.
	AT	Artur Ekert and Richard Jozsa "Quantum computation and Shor's factoring algorithm" Reviews of Modern Physics, Vol. 68, No. 3, pp. 733 - 753 (1996).
	AU	R. Feynman, "Simulating Physics with Computers", International Journal of Theoretical Physics 21, 467-488 (1982).
	AV	Daniel Gottesman, "Fault-Tolerant Quantum Computation with Local Gates" Los Alamos National Laboratory preprint quant-ph/9903099 (1999), accessed October 2, 2002.
	AW	R.B. Griffiths and C. Niu, "Semiclassical Fourier Transform for Quantum Computation" Physical Review Letters 76, 3228-3231 (1996).
	AX	L.K. Grover, "Quantum Mechanics Helps in Searching for a Needle in a Haystack" Physical Review Letters 79, pp. 325-329 (1997).
	AY	B.E. Kane, "A silicon-based nuclear spin quantum computer" Nature (London) 393, pp. 133-137 (1998).

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	AZ	A.Yu. Kitaev, "Quantum measurements and the Abelian Stabilizer Problem", Los Alamos National Laboratory preprint quart-ph/9511026 (1995), accessed October 2, 2002.
	BA	E. Knill, "Approximation by Quantum Circuits", Los Alamos National Laboratory preprint quant-ph/9508006 (1995).
	BB	D. Loss and D.P. DiVincenzo, "Quantum computation with quantum dots" Physical Review A 57, pp. 120-126 (1998).
	BC	Y. Makhlin, G. Schön, and A. Shnirman, "Quantum-State Engineering with Josephson-Junction Devices", Reviews of Modern Physics, Vol. 73, p. 357 (2001). [Also published as Los Alamos National Laboratory preprint cond-mat/0011269 (2000), accessed October 2, 2002.
	BD	C. Moore and M. Nilsson, "Parallel Quantum Computation and Quantum Codes" Los Alamos National Laboratory preprint quant-ph/9808027 (1998), accessed October 2, 2002.
	BE	Cristopher Moore "Quantum Circuits: Fanout, Parity, and Counting" Los Alamos National Laboratory preprint quant-ph/9903046 (1999), accessed October 2, 2002.
	BF	Dima Mozyrsky, Vladimir Privman and Mark Hillery, "A Hamiltonian for Quantum Copying", Los Alamos National Laboratory preprint quant-ph/9609018 (1997), accessed October 2, 2002.
	BG	M.B. Plenio and P.L. Knight, "Realistic lower bounds for the factorization time of large numbers on a quantum computer.", Los Alamos National Laboratory preprint quant-ph/9512001 (1995), accessed October 2, 2002.
	BH	P. W. Shor, "Polynomial-Time Algorithms for Prime Factorization and Discrete Logarithms on a Quantum Computer" Los Alamos National Laboratory preprint quant-ph/9508027 (1995), accessed October 2, 2002.
	BI	P.W. Shor, "Quantum Error-Correcting Codes Need Not Completely Reveal the Error Syndrome", Los Alamos National Laboratory preprint quant-ph/9604006 (1996), accessed October 2, 2002.
	BJ	Peter W. Shor, "Introduction to Quantum Algorithms", Los Alamos National Laboratory preprint quant-ph/0005003 (2000), accessed October 2, 2002.
	BK	S.M. Sait and H. Youssef, *VLSI Physical Design Automation*, pp. 141-195 (IEEE Press, New York, 1995).
	BL	A.. Saito, K. Kioi, Y. Akagi, N. Hashizume, and K. Ohta, "Actual computational time-cost of the Quantum Fourier Transform in a quantum computer using nuclear spins" Los Alamos National Laboratory preprint quant-ph/0001113 (2000), accessed October 2, 2002.
	BM	Andrew Steane, "Multiple Particle Interference and Quantum Error Correction", Los Alamos National Laboratory preprint quant-ph/9601029 (May 13, 1996), accessed October 2, 2002.
	BN	Rober Tucci, "A Rudimentary Quantum Compiler", Los Alamos National Laboratory preprint quant-ph/9805015 (1998), accessed October 2, 2002.

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	BO	W.G. Unruh, "Maintaining coherence in Quantum Computers", Los Alamos National Laboratory preprint hep-th/9406058 (1994), accessed October 2, 2002.
	BP	Colin P. Williams and Alexander G. Gray "Automated Design of Quantum Circuits" in *Quantum Computing and Quantum Communications*, Lecture Notes in Computer Science 1509, Colin P. Williams Ed., pp. 113-125 (1999).

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